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| EXAMINER |
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NEFF, MICHAEL R

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2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/559,697 | Applicant(s) CLAUSEN ET AL. | |
| | Examiner MICHAEL R. NEFF | Art Unit 2611 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/16/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 11 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term 'and/or' is indefinite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (herein after Awater) (US Patent 6,175,551 B1, see IDS).**

Re claim 16 Awater discloses a method for reducing the crest factor of a data symbol to be transmitted in a multi-carrier data transmission system (Col. 1 line 17-51), the data symbol being a function of a plurality of signals provided within a predetermined data frame (Col. 1 line 17-37), each of the plurality of signals allocated to a carrier (Col. 1 line 17-37), each carrier occupying at least one frequency from a transmit data spectrum (Col. 1 line 17-37), the method comprising: (a) receiving the predetermined data frame, the predetermined data frame having the data symbol and a prefix which is derived from a part of the data symbol (Col. 3 line 54-Col. 4 line 13); and (b) performing crest factor reduction corresponding to the predetermined data frame based at least in part on peak values within the cyclic prefix of the predetermined data frame (Col. 3 line 54-Col. 4 line 30; Figure 2 elements 30, 34).

Within the disclosure and cited areas, Awater does not specifically discuss reducing the crest factor of the multi-carrier signal. However, based on the disclosure of the applicant at Paragraph 0006 of the current application, the PAP ratio is directly correlated to the derivation of the crest factor; therefore it would have been obvious to one of ordinary skill in the art that the PAP ratio reduction would result in the reduction of the crest factor for the multi-carrier signal.

Re claim 17, Awater discloses the method as claimed in claim 16, wherein the step (b) further comprises searching for peak values exceeding a first threshold in the data symbol and in the cyclic prefix (Col. 4 lines 14-30).

6. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater in view of Schenk (US Patent 6,529,925 B1, see IDS).

Re claim 8 Awater discloses a method for reducing the crest factor of a data symbol to be transmitted in a multi-carrier data transmission system (Col. 1 line 17-51), the data symbol being a function of a plurality of signals provided within a predetermined data frame (Col. 1 line 17-37), each of the plurality of signals allocated to a carrier (Col. 1 line 17-37), each carrier occupying at least one frequency from a transmit data spectrum (Col. 1 line 17-37), the method comprising: receiving the predetermined data frame, the predetermined data frame exhibiting the data symbol and a cyclic prefix which is derived from a part of the data symbol (Col. 3 line 54-Col. 4 line 13); and performing crest factor reduction corresponding to the predetermined data frame based at least in part on peak values within the cyclic prefix of the predetermined data frame (Col. 3 line 54-Col. 4 line 30; Figure 2 elements 30, 34).

Within the disclosure and cited areas, Awater does not specifically discuss reducing the crest factor of the multi-carrier signal. However, based on the disclosure of the applicant at Paragraph 0006 of the current application, the PAP ratio is directly correlated to the derivation of the crest factor; therefore it would have been obvious to one of ordinary skill in the art that the PAP ratio reduction would result in the reduction of the crest factor for the multi-carrier signal.

Further the disclosure of Awater fails to explicitly disclose the limitation of at least one carrier being reserved which is not provided for the data transmission. This method is however rendered obvious by the disclosure of Schenk. Schenk discloses where at

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least one carrier being reserved which is not provided for the data transmission (Col. 1 lines 48-60) as being a well known tactic in the area of multi-carrier communication as a means for providing an initial reduction to the crest factor. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement this well known method to provide further reduction of the crest factor for the multi-carrier signal.

Re claim 9, the combined disclosure of Awater and Schenk as a whole disclose the method of claim 8, Awater further discloses wherein the step of performing crest factor reduction further comprises performing crest factor reduction based at least in part on peak values within the data symbol of the predetermined data frame (Col. 3 line 54-Col. 4 line 30; Figure 2 elements 30, 34).

7. Claims 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater and Schenk as applied to claim 8 above, and further in view of Henkel et al. (herein after Henkel) (US Publication "PAR reduction revisited: an extension of Tellado's method", see IDS).

Re claim 10, the combined disclosure of Awater and Schenk as a whole disclose the method of claim 8, however they fail to explicitly disclose the method further comprising: (a) filtering the data symbol and the cyclic prefix; (b) determining whether a time-domain function of the data symbol and of the cyclic prefix within the predetermined data frame exhibits at least one peak value that exceeds a first

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threshold; (c) determining an amplitude of an exhibited peak value and an associated position within the predetermined data frame; (d) generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the exhibited peak value; and (e) modifying the data symbol to be transmitted by superimposing the correction function.

This method is however disclosed by Henkel. Henkel discloses the method comprising: (a) filtering the data symbol and the cyclic prefix (Page 31-2, Section II Paragraphs 1-2; Section IV); (b) determining whether a time-domain function of the data symbol and of the cyclic prefix within the predetermined data frame exhibits at least one peak value that exceeds a first threshold (Page 31-1 column 2); (c) determining an amplitude of an exhibited peak value and an associated position within the predetermined data frame (Page 31-2 Col. 2); (d) generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the exhibited peak value (Page 31-2 Col. 1-2); and (e) modifying the data symbol to be transmitted by superimposing the correction function (Page 31-2 - Page 31-3 Col. 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate peak detections and reduction method as disclosed by Henkel within the combined crest factor reduction method disclosed by Awater and Schenk in order to gain the added benefit of further detail and efficiency in the peak reduction processing methods.

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Re Claim 11, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 10, Henkel further discloses the method further comprising repeating steps (b) - (e) until the data symbol no longer exhibits any peak values above the first threshold and/or a predetermined number of iteration steps has been reached (Page 31-1, Col. 2 last paragraph).

Re Claim 12, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 10, Henkel further discloses the method comprising repeating steps (a) - (e) are repeated until the data symbol no longer exhibits any peak values above the first threshold and/or a predetermined number of iteration steps has been reached, the data symbol modified by the correction function being used for the filtering in step (a) (Page 31-1, Col. 2 last paragraph).

Re Claim 13, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 10, Henkel further discloses the method further comprising oversampling at least the data symbol prior to step (b) (Page 31-2 Section II).

Re Claim 14, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 10, Henkel further discloses the method wherein step (d) further comprises using a dirac-like function as the sample correction function (Page 31-2 Section II).

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Re Claim 15, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 10, Henkel further discloses the method wherein step (d) further comprises using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain (Page 31-2 Section II).

8. Claims 18-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater as applied to claim 17 above, and further in view of Henkel.

Re claim 18; Awater discloses the method as claimed in claim 17, but fails to explicitly disclose wherein in step (b) further comprises filtering the data symbol and the cyclic prefix over the predetermined data frame prior to searching for peak values.

This method is however disclosed by Henkel. Henkel discloses the method wherein in step (b) further comprises filtering the data symbol and the cyclic prefix over the predetermined data frame prior to searching for peak values (Section II; IV).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate peak detections and reduction method as disclosed by Henkel within the combined crest factor reduction method disclosed by Awater and Schenk in order to gain the added benefit of further detail and efficiency in the peak reduction processing methods.

Re Claim 19, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 18, Henkel further discloses the method wherein filtering the

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data symbol and cyclic prefix further comprises using filtering characteristics corresponding to a downstream filter of the multi-carrier data transmission system (Section II; IV).

Re Claim 20, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 18, Henkel further discloses the method wherein step (b) further comprises determining an amplitude of an identified peak value and an associated position within the predetermined data frame; and generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the identified peak value (Section II).

Re Claim 21, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20, Henkel further discloses the method wherein step (b) further comprises modifying the data symbol to be transmitted by superimposing the correction function (Section II).

Re Claim 22, Awater discloses the method as claimed in claim 17, but fails to explicitly disclose wherein step (b) further comprises oversampling at least the data symbol prior to searching for peak values.

This method is however disclosed by Henkel. Henkel discloses the method wherein step (b) further comprises oversampling at least the data symbol prior to searching for peak values (Section II).

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Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate peak detections and reduction method as disclosed by Henkel within the combined crest factor reduction method disclosed by Awater and Schenk in order to gain the added benefit of further detail and efficiency in the peak reduction processing methods.

Re Claim 23, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20, Henkel further discloses the method wherein step (d) further comprises using a dirac-like function as the sample correction function (Section II).

Re Claim 24, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20, Henkel further discloses the method wherein step (b) further comprises using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain (Page 31-2 Col. 2).

Re Claim 25, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20, Henkel further discloses the method wherein step (b) further comprises oversampling at least the data symbol prior to searching for peak values (Section II).

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Re Claim 26, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 25, Henkel further discloses the method wherein step (d) further comprises using a dirac-like function as the sample correction function (Section II paragraphs 1-2).

Re Claim 27, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 25, Henkel further discloses the method wherein step (b) further comprises using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain (Page 31-2 Col. 2).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL R. NEFF whose telephone number is (571)270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL R. NEFF/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611